

Abstract

The present invention provides a set-reset flip-flop operating in an all-optical manner. In this invention, a set pulse is inputted from the setting port. In doing so, only oscillation in set mode is generated at the multi-mode interference portion in a waveguide. As a result, a non-inverting output Q is obtained from the non-inverting output port. This state is then continued even if the set pulse input goes off. Next, a reset pulse is inputted to the resetting port. In doing so, at the multi-mode interference portion, oscillation of light in the set mode is halted, and oscillation in the reset mode occurs. As a result, it is possible to obtain an inverting output Q -bar from the inverting output port. This state is then continued even if the reset pulse goes off.